Policy, Planning, and Research

WORKING PAPERS

Education and Employment

Population and Human Resources
Department
The World Bank
January 1989
WPS 142

Vocational Secondary Schooling in Israel:
A Study of Labor Market Outcomes

Aurian Ziderman

Most economists consider vocational education to be socially inefficient. Israel may prove them wrong — particularly for students whose occupations are related to their course of study.

Policy, Planning, and Research

WORKING PAPERS

Education and Employment

Israel is a fitting place to compare the outcomes of academic and vocational schooling. More than half the Israeli secondary school pupils attend vocational schools or vocational streams in comprehensive schools.

A study based on 1983 Israeli census data shows vocational schooling to be more cost-effective than general academic education. In particular, vocational school completers who work in occupations related to their course of study earn about 10 percent more a year than their counterparts who either attended secondary schools or who attended vocational schools but were employed in occupations unrelated to their course of study.

Studies that show vocational schooling to be cost-ineffective compared with academic schools tend to concentrate on earnings, without taking into account such variables as the relevance of the type of occupation to the vocational studies pursued. Future evaluation studies should pay more attention not only to that variable but to issues of curriculum (including the type and scope of vocational studies).

This paper is a product of the Education and Employment Division, Population and Human Resources Department. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Cynthia Cristobal, room S6-035, extension 33640.

VOCATIONAL SECONDARY SCHOOLING IN ISRAEL:

A Study of Labor Market Outcomes

Summary and Implications

This paper examines the efficacy (in terms of labor market outcomes) of vocational school education in relation to that of the academic secondary school; the focus is on non-postsecondary school attenders. Given the relatively small fraction of youth that attend, and complete, tertiary education in developing countries, the secondary school completer population that does not continue into tertiary education, plays an important role in economic development. Since vocational schooling in Israel is sizeable - with over half of Israeli secondary school pupils attending vocational schools or vocational streams in comprehensive schools, it is quantitatively far more important than in most other countries - the Israeli setting seems to be a fitting one for a case study comparing the outcomes of academic and vocational schooling.

Using data from the 1983 population census, the study shows vocational schooling to be more cost-effective than general academic education. In particular, those vocational school completers that work in occupations related to the course of study pursued at school earn more (by up to about 10 percent annually) than their counterparts that attended general secondary schools or those from vocational schools employed in non course related occupations.

These results are at odds with the predominantly held view (of economists) that vocational schooling is a socially inefficient form of education, particularly in relation to traditional academic schools. Most follow-up evaluation studies show vocational schools to be cost-ineffective compared with academic schools. However, the present paper shows the importance of broadening the scope of these evaluation studies, particularly in relation to labor market outcomes. Too often such studies concentrate on earnings, without taking into account such intervening variables as type of occupation and its relevance to vocational studies pursued. In this case study, we have seen that such considerations are central to a proper understanding to the labor market outcomes of vocational schooling. Future evaluation studies will need to pay more attention to issues of curriculum (including the type and scope of vocational studies), as well as to the nature of the occupation followed and its relationship with prior courses of study pursued.

Acknowledgements

I am indebted to Dr. Shoshana Neuman of Bar Ilan University, Israel and Consultant to the World Bank, who processed the data and ran the regressions for this study.

Helpful comments on a first draft of this paper were provided by Professor Avril V. Adams of George Washington University and by Elizabeth King, my colleague at the World Bank.

Thanks are offered to the following Israeli officials for assistance, advice and hospitality, generously extended, on my recent Bank mission in connection with this study:

Ministry of Labor and Social Welfare:

David Katz, Director
Manpower Planning Authority

Eli Paz, Director
Manpower Training and Development Bureau

Benny Levinson, Head of Pedagogic Department
Manpower Training and Development Bureau

Yizhak Kroner, Head of Apprenticeship
and Youth Department
Manpower Training and Development Bureau

Ministry of Education and Culture:

Uri Tsuk, Director
Technical and Vocational Education Department

Ehud Bar, Deputy Director
Planning Department

The author, alone, is responsible for what is written in this paper.

CONTENTS

1. Vocational Schooling in Israel

Introduction:

Since the publication of Foster's now classic paper on the vocational schooling fallacy (Foster, 1966), the appropriate role to be accorded to vocational education within both the schooling and the training systems has been an issue of serious, even intense, debate. The protagonists in this debate have been defined largely along disciplinary lines: educational economists have been in the forefront of those pressing the offensive, while educational policy makers and administrators, particularly in developing countries, have continued to argue, often on the basis of perceived labor market needs, that vocational education should remain a central element in national educational policies.

Meanwhile, available evidence suggests that vocational schooling, round the world, is in retreat. Benavot (1983), on the basis of published UNESCO statistics, has pointed to a world-wide secular decline since the 1950s in the proportion of secondary school pupils attending vocational schools,[1/] while a recent survey of World Bank lending for vocationally-specific education and training has shown a clear and significant shift over the past two decades away from vocational secondary school projects towards various forms of non-formal training (Middleton, 1988). Moreover, a growing case study literature has tended to argue that, in comparison with the

---

[1] These conclusions may need to be modified in the light of a new study near completion and based on more recent UNESCO data than those employed by Benavot. This shows, for more recent years, a tendency for the vocational school enrollment proportion to increase. See Komenan and Ziderman, forthcoming.

traditional academic secondary school, vocational schools are simply not cost effective.[2/] Similarly, a number of studies have shown vocational schools to be a high cost form of training for the skilled trades, in relation to alternative more closely job-based training modes, such as the traditional apprenticeship.[3/] So the place of vocational schooling within both the schooling and training systems is under attack.

We present this case study appraising the economic outcomes of vocational secondary schools within this context. It is felt that an examination of the Israel experience, where so much relative importance has been accorded to vocational schooling, should be of interest, both in its own right and also in adding to the roster of case studies round the world, on these issues. In Israel well over half of all secondary school pupils (and over 40 per cent of all youth of secondary school age) attend vocational secondary schools. Outside of the East European counties, where national economic planning dictates that the educational system at the secondary level is dominated by vocational schools, only a handful of countries exhibit as large a vocational secondary school sector.[4/] Moreover, the proportion of secondary school pupils attending vocational schools has shown a secular, and continuing, rise over time, thus departing from comparative international norms (Benavot, 1983).

---

[2] This literature has been reviewed in Zymelman (1976), Psacharopoulos (1987) and Tilak (1988). Two recent World Bank studies of vocational education in Peru (Moock and Bellew, 1988) and the Ivory Coast (Grootaert, 1988) are confirmatory of these results.

[3] For a discussion, see Metcalf (1985).

[4] This small group of countries includes Belgium and the Netherlands, Argentina, and El Salvador: see UNESCO year book.

schools has shown a secular, and continuing, rise over time, thus departing from comparative international norms (Benavot, 1983).

Israel is a country with many unique institutions and social achievements. Over the forty years since independence, the challenges of a fivefold increase in population, of the absorbtion of large-scale waves of immigration from varied cultural environments and of external security, have all found responses in, and have been facilitated by, institutional change and the fashioning of a technologically vibrant society. These dramatic changes that have ensued over recent decades have rendered Israel a productive framework for socio-economic research: this is particularly the case with the education sector.

Education has played a central role as a facilitator of change. At the outset of statehood, the educational attainment level of the Jewish population in Israel was amongst the highest in the world, second only to the United States. Richard Easterlin, writing in the early 1960s, has ascribed a major role to the richness of the country's human capital resources in explaining Israel's success in physically absorbing the particularly heavy immigration in the early years of statehood (Easterlin, 1961). Social and cultural integration was less easily accomplished. Mass immigration, particularly of lower educated migrants from North Africa and Asia, of relatively low socio-economic status, led to a considerable dilution in the education attainments of the population. The subsequent expansion of the educational system, and the particular form and directions it took, can only be understood in the context of the overriding social goal

of integrating the various ethnic groups and, in particular, that of closing the socio-economic gap between those of Western origin and the more recent immigrant groups from North Africa and Asia (which now constitute the majority of the population).

In this paper, as we have noted, our focus is on secondary school vocational education. We present an appraisal of outcomes, in relation to educational alternatives, for that age group - both of the more traditional academic secondary schools (henceforth "academic" schools) and also informal training systems more closely linked to the world of work. Our approach is an economic one, adopting the now traditional human capital model to appraise outcomes, in terms of labor market success, as measured by earnings. Yet in interpreting the results presented, it will be important to adopt a broad perspective, since vocational education in Israel as in many other countries, serves important social as well as manpower goals.

Size, growth and structure of the vocational schooling system:

Although vocational schooling in Israel has a long history - the first vocational school was set up over a century ago - most secondary schooling in Israel at the time of independence in 1948, was of the traditional, academic kind, with less than a fifth of all secondary school pupils enrolled in vocational schools; a similar ratio persisted for the next fifteen years. Subsequently, the development of vocational schooling was rapid: it constituted some 38 percent of secondary school pupils by 1970, and by the end of that decade had exceeded the 50 per cent mark.

Table 1 reviews the main development of vocational schooling since 1948, in terms of numbers of schools and pupils.[5/]

This rise in the relative importance of vocational schools in Israel, and (as will be shown) its changing structure, must be viewed against the background of the dilemma facing the authorities in the early years. The central issue was: how to integrate into the dominant framework of society the large numbers of youth of Oriental origin (stemming from North Africa, the Middle East and Yemen) with low academic ability and socio-economic status, yet at the same time both maintaining the academic standards of the general secondary school system and meeting the country's needs for high level technical manpower, as dictated by imperatives of defense and the development of the economy? No major role was accorded to apprenticeship or education and training with a strong job market orientation. Both the need for a unifying, integrating framework as well as Jewish cultural norms established over the centuries, required that the dilemma be resolved within the framework of the full-time schooling system,

---

[5] Columns 1 and 2 in the table contain some double counting in the case of comprehensive schools, containing both general and vocational streams; each stream is entered as a separate "school", to indicate the extent of the two forms of study. In 1986/87, there was a total of 516 schools, of which 173 (a third) were comprehensive (multi-stream) schools. With the aim of facilitating social integration as well as building a parity of esteem between the more elitist general and the lower status vocational sub-sectors, comprehensive schools along the lines of the British model have become an increasingly prominent feature of the secondary schooling system in Israel, with over 43 per cent of secondary school pupils now attending comprehensive schools.

Table 1

General, Vocational and Agricultural Secondary Schooling: Comparative Statistics

Year	Number of Schools			Number of Students		
	General	Vocational	Agricultural	General	Vocational	Agricultural
1948/49	39	26	-	7,168	2,002	-
1959/60	113	60	30	32,894	10,167	5,016
1969/70	219	258	30	63,731	49,556	7,641
1970/71	210	265	30	59,207	53,847	7,462
1971/72	208	288	29	54,908	60,039	7,189
1972/73	210	297	29	54,903	63,778	6,683
1973/74	212	302	28	54,064	64,068	6,464
1974/75	217	307	27	57,408	64,648	5,877
1975/76	222	317	27	56,519	65,677	5,655
1976/77	224	315	27	56,796	66,307	5,371
1977/78	225	317	28	57,199	66,613	5,620
1978/79	210	310	27	57,499	67,720	5,460
1979/80	231	310	27	61,581	70,681	5,108
1980/81	246	313	27	63,990	73,785	4,704
1981/82	246	304	27	66,155	76,361	4,284
1982/83	267	301	26	70,310	76,636	4,970
1983/84	278	305	26	74,704	79,957	4,692
1984/85	292	305	26	73,213	84,631	4,648
1985/86	306	306	26	83,933	89,385	5,104
1986/87	305	308	26	86,813	91,720	4,683

itself.[6/] Indeed, the educational system soon became the main framework for social and cultural integration.

Since the traditional, academic curriculum of the general secondary schools, with its orientation towards entry to tertiary education was inappropriate for the large numbers of youth of Oriental and low socio-economic background, the more practically orientated vocational schools expanded at a faster pace, parallel with the growth in population and with the increasing proportion of 14-17 years old (especially of Oriental origin) staying on at school. Impetus was added to the expansion of vocational schools by the enactment in 1969-70 of compulsory education for youth aged 14 and 15, and of free secondary schooling, and more directly with the transfer of control of the system from under the aegis of the Ministry of Labor to that of the Education Ministry (and its reorganization within a Vocational Education Department).

The transfer of vocational education to the Ministry of Education in the early 1960s had a serious impact on its content, as well as the quantity.[7/] In the early years, the task of the vocational schools had been clearly defined as preparing youth for employment in the labor market in the manual trades, with the emphasis in the curriculum on practical instruction.

---

[6] For a fuller discussion of these issues, the reader is referred to Kahane and Starr (1976) and Iram (1986).

[7] The Ministry of Labor was left with residual responsibility only for those disadvantaged youth on the margin which, unable to be absorbed within existing secondary schools, were accommodated in nonformal training systems carrying low social status; these (to be discussed later) included formal apprenticeships and factory based industrial schools.

It represented more of a training than an educational system. With the transfer, more theoretical and academic subjects were introduced, and by the mid 1960s in response to the call, emanating from industry and the army, for a more technologically oriented labor force, such specialties as electronics and electricity were given a more central role. This process of broadening and upgrading the curriculum was facilitated by the introduction in 1969/70 of the vocational "tracks", which now characterize the vocational schooling system.

Three main tracks were introduced, each leading to appropriate trade diplomas. The highest (masmat) track leads to matriculation (the Bagrut examination) and entry to higher education. There are two non-matriculation tracks, the regular and the practical (masmam) track; these more closely conform to the traditional training role. However, today nearly sixty per cent of vocational school pupils study in the masmat track, compared with only a third in the mid 1970s. It is normal practice for masmat students to present themselves for the Bagrut examinations, particulary for the technological specialization introduced towards the end of the 1970s (over 70 per cent now do so, a dramatic change from the situation in the early 1970s when this was rather exceptional). The regular track has shown a steady decline in enrollment, from about a half of all vocational school pupils fifteen years ago to less than a third today, while the masmam track (comparable with training modes offered by the Ministry of Labor, to be discussed in Section 4) accounts for some 15 per cent of the total.

The foregoing discussion has argued that the vocational school system in Israel is far broader in scope and aim than is typically the case in many other countries. It is the country's main vehicle for technologically oriented education and for the achievement of national policies of integration of diverse ethnic groups and equality of opportunity through universal secondary education. The training of skilled workers for the manual trades, historically its major role, while still significant today, does not now constitute its major focus.

2. Vocational and Academic Schools: Comparison of Labor Market Outcomes

The major concern of this section is to compare the labor market (earnings) outcomes of the two major alternative forms of secondary schooling in Israel. Have those who attended vocational secondary schools achieved higher earnings than those attending academic secondary schools? Have any such earnings differences continued to hold over the longer term? We look at these issues using relevant data drawn from the 20 percent sub sample of the 1983 Census of Population and Housing.[8/]

Data:

The Census of Population 20 percent sub-sample questionnaire collected information on level and type of terminal schooling. This made it possible to identify two broad groups of individuals that are the focus of

---

[8] A fuller account of sources and method is given in Neuman and Ziderman, 1988A.

this paper: those who terminated education at a vocational secondary and at an academic secondary school, respectively.[9/] For secondary school completers that went on to post-secondary education, it was not possible to identify type of secondary school attended; they are not included in the present analysis.

Only individuals in the 25-49 age group at the time of the Census are included in this research. The upper age limit was set in order to exclude individuals who had attended secondary school before 1948, the year of statehood; the lower, to allow at least three years possible labor market experience, following 3 year compulsory military service at age 18. Since our concern is with the Israeli education system, we excluded (on the basis of age and year of migration) the large number of immigrants who had attended school abroad. Finally, the present study relates only to male full-time workers (a worker is considered "full-time" if he worked at least 35 hours in the week prior to the Census). In all, some 16000 individuals were included in the sample, nearly 11000 vocational school completers and some 5000 individuals who had completed a general secondary school; the number of observations in the regressions that follow is somewhat smaller, however, because of missing values.

---

[9] In fact, individuals that had concluded other forms of vocational training for youth, notably the formal apprenticeship and industrial schools, were also included within the category of vocational school completers; also included were those that attended agricultural secondary schools. However these groups constitute a small, and declining, proportion of vocationally educated students.

Table 2 presents characteristics of the sample of secondary school completers as a whole, as well as of each group (completers of vocational and of academic schools) separately. It appears that personal characteristics (age, years of schooling, experience and ethnic origin) are quite similar for both groups. The two groups do differ by level of school certification attained, particularly with regard to matriculation (the Bagrut), which leads to entry into higher education: nearly 29 percent general school completers obtained the highest level of certification, compared with only 7 percent for the vocational school group.

There are no significant differences between the two groups in the percentage not participating in the labor force (a little over 10 percent). There are, however, some differences between the two groups in terms of the distribution of employ t by economic sector and by occupation. For both groups, Industry is the leading sector, followed by the Public sector; vocational school completers are very much under-represented in the Finance sector. Skilled work is the main occupation, followed by Clerical work, for both groups; the former assumes greater relative importance for vocational school completers, and the latter for those of academic schools. Relatively more academic school graduates enter managerial occupations.

Table 2

Characteristics of Sample by Type of Secondary School Attended

List of Variables	Whole Sample		Vocational Schools		General Schools	
	Value	Standard Deviation	Value	Standard Deviation	Value	Standard Deviation
Mean Monthly Income (Shekel)	38,188	30,175	37,396	27,129	40,083	36,376
Mean Years of Schooling	11.185	1.045	11.122	1.033	11.336	1.058
Mean Years of Experience	16.582	6.708	16.057	6.367	17.833	7.309
Mean Age	33.767	6.584	33.179	6.245	35.169	7.138
Mean Weeks Worked Last Year	50.164	6.888	50.192	6.771	50.099	7.161
Mean Hours Worked Last Week	49.718	7.858	49.733	7.782	49.582	8.038
Percentage of Oriental Origin	56.850		58.277		53.455	
School Certification Attained (%)						
No certificate attained	6.264		6.205		6.404	
Primary or intermediate level completion	19.166		19.320		18.797	
Secondary level completion	61.222		67.606		45.995	
Matriculation (Bagrut)	13.348		6.869		28.804	
Economic Sector (%)						
Industry	35.340		38.926		26.784	
Electricity	2.841		3.297		1.753	
Commerce	11.392		10.757		12.905	
Finance	7.860		5.164		14.293	
Transportation	11.392		11.472		11.200	
Public Services	17.361		15.911		20.818	
Private Services	4.344		4.868		3.092	
Construction	6.336		6.573		5.771	
Agriculture	3.134		3.032		3.384	
Occupation (%)						
Scientific & Academic Workers	0.518		0.459		0.657	
Professional & Technical Workers	8.163		8.369		7.670	
Managers	8.508		6.879		12.393	
Clerical Workers	16.260		12.166		26.029	
Sales Workers	7.386		6.675		9.082	
Service Workers	6.846		6.471		7.743	
Skilled Workers	48.385		55.042		32.505	
Unskilled Workers	2.459		2.480		2.411	
Agricultural Workers	1.475		1.459		1.510	
Sample Size	15,846		10,800		5,046	

Methodology:

Earnings functions of the traditional Mincer type are estimated for the sample of secondary school completers.[10/] The log of monthly earnings is run against a dummy variable (VOC) describing type of school attended, either vocational (=1) or academic (=0). We hold constant a series of explanatory variables relating to other dimensions of education received, to various personal background characteristics, and to aspects of labor market involvement. A positive, and significant, coefficient on the VOC variable would indicate that completers of vocational secondary schools earned more, on average, than their academic secondary school counterparts.

The full set of variables employed in the regressions are as follows:

Schooling variables:

YRS.SCH: years of schooling (ranging from 8 to 12 years)

VOC: a dummy variable indicating type of school attended (vocational secondary school=1, academic=0)

A series of dummy variables, P.CERT, S.CERT and BAG, relating to the highest level of school certification attained - completed primary or intermediate level, completed secondary schooling, and gained Bagrut (matriculation), respectively. The category, "no certificate obtained" enters the constant term.

---

10 On specification and estimation of earning functions see Dougherty and Jimenez, 1987.

A series of dummy variables relating to occupation: ACAD (scientific and academic workers), TECH (other professional and technical workers), MANAG (managers), CLER (clerical workers), SALES (sales workers), SERV (service workers), SKILL (skilled workers), UNSKIL (unskilled workers), with agricultural workers in the constant term.

Personal background variable:

ETHNI: a dummy indicating ethnic origin (Oriental=1, Western=0)

Work related variables:

EXP: years of work experience (defined as Age-SCH-6)

WEEKS: log of number of weeks worked in the past year

HOURS: log of hours worked in the past week[11/]

A series of dummy variables relating to sector in which employed: Industry (IND), Electricity (ELECT), Construction (CONST), Commerce (COMM), Transport (TRANS), Public services (PUB), Private services (PRIV), with Agriculture in the constant term.

Regression results:

Regression runs relating to the whole sample are provided in Table 3. Regressions (1) and (2) follow closely the now classical formulation of

---

11 The reason for taking the natural logarithm of the weeks and hours variables is that they are highly skewed to the left (most workers working 45 hours a week and 52 weeks a year). By taking the log, the dist ibution becomes more symmetric.

Table 3

Regressions of Monthly Earnings (ln)
Full Time, Male, Salaried Workers - Israeli Census, 1983
(n=13879)

	(1)		(2)		(3)	
	Co-efficient	t-statistic	Co-efficient	t-statistic	Co-efficient	t-statistic
YRS.SCH	0.041	3.18	0.020	1.53	0.003	0.22
EXP	0.036	3.77	0.036	3.69	0.029	2.93
EXP^2	-0.0008	7.45	-0.0008	7.40	-0.0007	7.01
EXP*YRS.SCH	0.001	1.48	0.001	1.62	0.001	1.99
WEEKS (ln)	0.317	16.80	0.314	16.66	0.314	16.67
HOURS (ln)	0.297	9.13	0.301	9.25	0.300	9.24
ETHNIC	-0.135	14.09	-0.130	13.49	-0.128	13.23
Economic Sector:						
IND	0.075	2.60	0.075	2.51	0.076	2.53
ELECT	0.267	6.73	0.267	6.73	0.268	6.75
COMM	-0.028	0.88	-0.026	0.82	-0.026	0.82
FINAN	0.137	4.07	0.131	3.88	0.132	3.91
TRANS	0.073	2.27	0.072	2.26	0.073	2.29
PUB	-0.029	0.92	-0.029	0.92	-0.028	0.90
PRIV	-0.055	1.54	-0.055	1.53	-0.054	1.50
CONST	-0.006	0.18	-0.003	0.08	0.001	0.05
Occupation:						
ACAD	0.255	3.32	0.253	3.30	0.253	3.30
TECH	0.372	8.24	0.369	8.18	0.368	8.16
MANAG	0.051	11.12	0.496	11.03	0.497	11.03
CLER	0.194	4.43	0.194	4.43	0.194	4.43
SALES	0.196	4.25	0.195	4.22	0.195	4.24
SERV	0.183	3.97	0.186	4.04	0.186	4.04
UNSKILL	0.099	1.92	0.102	1.98	0.102	1.99
SKILL	0.177	4.13	0.180	4.20	0.180	4.19
Certification:						
P.CERT	--	--	0.0005	0.02	0.0003	0.01
S.CERT	--	--	0.071	3.55	0.071	3.57
BAG	--	--	0.122	5.01	0.122	5.01
VOC	0.020	1.93	0.026	2.42	-0.217	1.78
VOC*YRS.SCH	--	--	--	--	0.016	1.67
VOC*EXP	--	--	--	--	0.003	2.07
Intercept	6.794	30.97	6.949	31.46	7.183	29.13
R^2	0.166		0.169		0.169	

Mincer (1974) with an additional interaction term EXP*YRS.SCH which takes account of the possibility of increasing (or diminishing) returns to schooling as experience advances.[12/]

The regressions give results generally in line with those from similar earnings functions for other countries.

Focussing, at first, on regression (1), monthly earnings are seen to be strongly, and positively, related to years of schooling and of experience, though the negative coefficient on experience squared shows that earnings decline for additional higher levels of experience. The coefficient on YRS.SCH, under certain assumptions (see Mincer, 1974), can be interpreted as a measure of the annual rate of return accruing to individuals for each extra year attended at secondary school - in this case, a little over 4.0 per-cent. (The coefficient of EXP*YRS.SCH is insignificant.) Individuals of Western origin earn more, on average, than those of Oriental background; the coefficients on the other control variables also do not occasion surprise. The significance on the VOC variable points to an earnings advantage accruing to those that chose to study at vocational, rather than academic secondary schools; the former earn, on average, some 2% more per month.

---

[12] If this variable appears to be significant, we should add up its coefficient multiplied by the average number of years of experience to the schooling coefficient in order to receive the whole effect of schooling. Similarly - in order to have the effect of experience we should add its coefficient, multiplied by the average number of years of schooling, to the experience coefficient (the results would be valid for the means' points).

To the extent that those who complete a course of study and gain a certificate are more able than those who do not (given years of schooling) the lower level of certification amongst vocational school completers (as indicated in Table 2) could bias the results against vocational schools. To correct this, we add dummy variables representing, and thus holding constant, level of certification attained and indirectly correcting for differential ability.[13/] The results are presented in regression (2). The variables S.CERT and BAG are positive and highly significant. As expected, the effect is to lower (by over a half) the coefficient on YRS.SCH (and thus lowers measured rates of return on years of schooling). The level of significance of VOC is raised, while the coefficient on YRS.SCH is now insignificant.

We took account of the possibility that certification may exert a differential effect, according to type of schooling. A Bagrut (matriculation) certificate obtained from a traditional academic secondary school may be regarded as of more value than one from a vocational school; similarly, a secondary school completion certificate from vocational school is, supposedly, more job-oriented and may have greater market value than one from an academic school. To test this, we may introduce the interaction terms: VOC*P.CERT, VOC*S.CERT and VOC*BAG. The interpretation of a negative coefficient on the latter term, for example, is that the holder of a Bagrut certificate, on average, earns less if he attended a vocational school.

---

13 A positive coefficient on the certification variables could also be interpreted as an indicator of credentialism, whereby educational certificates, as such, confer earnings benefits additional to those stemming from years of education.

However, since all these interaction terms were non-significant in some earlier regression runs, indicating that there is no differential effect of certification according to type of school attended, it was decided not to include them in the reported regression results.

Interaction terms were added to examine for any differential effects on earnings according to type of school attended, within the various economic sectors and occupational groups. Again, since all of these additional interaction terms proved to be insignificant, and the other coefficients were in line with those shown in regression (2), we do not include these regression results in the table.

In regression (3) we take account of the possibility that both human capital variables - YRS.SCH and EXP - may exert a differential effect, according to type of schooling. As vocational secondary schools are more job oriented, it is possible that each year of vocational schooling (where more technical skills were received) and each additional year of experience (during which these skills are put to use) may have more impact on productivity and, hence, on earnings. To test for this, we introduce in regression (3) two additional interaction terms: VOC*YRS.SCH and VOC*EXP. The regression (3) results suggest that the effect of years of experience on earnings is stronger for vocational schools completers, although by only an additional 0.3% above the return of 2.9% on a year of experience for academic schools completers. The impact of schooling is significantly stronger for vocational schools completers only at a significance level of 0.10 per-cent. The overall conclusion is that for those who attended

vocational schools, human capital traits do have additional, though limited, market value.[14/]

Age cohort analysis:

Thus far, our attention has been focussed on the sample as a whole: the question arises whether these results are equally valid for all age groups included in the sample, ranging from age 25-49. To test whether the relative impact of type of schooling differs with age group, separate regressions are run for five-yearly age groups. The specification of these age-cohort regressions conforms to that of regression (2) in Table 3, except that the experience terms are omitted, since the intra-cohort experience will not differ greatly.

In order to target the exposition, we present in Table 4 selected results only, relating to the coefficients for the variables on which this study focuses: VOC and level of certification. (The full regression results are available on request). VOC now appears as significantly positive only for the older age groups 35-39 and 45-49; for the younger age cohorts (up to age 35) the coefficient on the VOC variable is not significant, indicating no earnings differences, on average, between vocational and academic secondary school completers. This latter finding is of some importance, since the labor market experience of the younger age groups is

---

[14] There is another empirical result worth noting: when introducing VOC*YRS.SCH and VOC*EXP, in regression (3), VOC loses its significance. This means that the whole positive effect of vocational schools on earnings runs through the differential effects of the human capital dimensions.

Table 4

Regressions of Monthly Earnings (ln), by Age Group, Selected Coefficients: Full Time, Male, Salaried Workers Completers of General & Vocational Schools-Israeli Census, 1983

	Age Group: 25-29	Age Group: 30-34	Age Group: 35-39	Age Group: 40-44	Age Group: 45-49
P.CERT	-0.00	0.032	0.037	-0.132	0.001
	(0.20)	(0.73)	(0.77)	(0.193)	(0.01)
S.CERT	0.088	0.057	0.120	-0.055	0.066
	(2.64)	(1.40)	(2.65)	(0.85)	(1.11)
BAG	0.172	0.102	0.142	0.024	0.106
	(4.35)	(2.06)	(2.45)	(0.31)	(1.43)
VOC	0.002	-0.006	0.046	0.021	0.072
	(0.10)	(0.25)	(1.92)	(0.64)	(2.20)
N	4,500	3,776	2,778	1,492	1,333
R^2	0.083	0.096	0.145	0.186	0.193

t values in parentheses

perhaps more relevant than that of the older ones (who will have completed secondary schooling some decades ago). The schooling of the former more closely conforms to current practice, in terms of curriculum, objectives and overall educational effectiveness.

Of some interest, though not directly germane to our main theme, is the results for the certification dummies: only for the younger groups are some of these certification terms positive and tend towards significance. Taken at its face value, this latter result suggests that in the past the acquisition of a diploma, as such, for those terminating education at the secondary school level did not lead to higher earnings; however, the possession of a "more recent" diploma does augment earnings, over and above the earnings increase resulting from additional years of secondary schooling. Seemingly credentialism, absent in the past, may now be coming evident in Israel, a result supportive of earlier work on this issue for Israel (see Katz and Ziderman, 1980). Moreover, the lack of significance on the VOC-certification interaction terms in additional regressions (these results are not reported in the table), indicates the absence of any differential credentialism effect by type of school attended.

Training costs:

Overall the foregoing regression results suggest that the earnings of individuals terminating formal education at a vocational secondary school do not differ from (and clearly do not fall short of) the earnings of academic secondary school completers. This result, indicating similar

economic outcomes for the two types of schooling, does not necessarily imply a clean bill of health for vocational schools. At issue is not the comparative economic outcomes of vocational and academic schools as such, but rather these outcomes in relation to costs.

While reliable information on the costs of secondary vocational and academic schooling in Israel is lacking, a preliminary attempt at measuring comparative costs is made in Table 5. Based upon official estimates of national expenditure on academic secondary schools and on vocational and agricultural schools, respectively, the table shows the proportional differential of national expenditure per pupil in vocational over academic schools (Column 5). Only for the first two budget years of available data (1969/70 and 1970/71) is this proportion larger than unity indicating higher per student vocational school costs; henceforth it is generally negative. This indicates that vocational education (on average, though not necessarily in particular subjects, such as electronics) is the less expensive - for recent years, by over 10 per-cent and for the most recent year (1984/85) by about a quarter. In 1982/83, the year corresponding to the Census, vocational schools were 8 percent cheaper.

These result may occasion some surprise. Available international evidence shows a cost advantage to academic schools. In Israel, too, the view is widely held that such factors as higher equipment costs and smaller class size in vocational schools (23.4 pupils per class compared with 31.9 in general schools, in 1986/87) place such schools at a cost (per pupil) disadvantage of up to a third, compared with general schools. Against this,

Table 5

National Expenditure per Student, Vocational and Academic Secondary Schools

Year	National Expenditure		National Expenditure per Student		Proportional Differential Vocational School Costs per Student	
	Academic Schools 1	Vocational Schools 2	Academic Schools 3	Vocational Schools 4	(4-3)/4	
1969/70	115	114	1.80	2.51	1.39	+0.39
1970/71	125	164	2.10	2.67	1.27	+0.27
1971/72	201	208	3.67	3.09	0.84	-0.16
1972/73	268	236	4.88	3.35	0.69	-0.31
1973/74	365	357	6.75	5.06	0.75	-0.25
1974/75	466	477	8.12	6.76	0.82	-0.18
1975/76	588	678	10.46	9.50	0.91	-0.09
1976/77	861	1007	15.16	14.05	0.93	-0.07
1977/78	136	166	2.38	2.30	0.97	-0.03
1978/79	224	289	3.89	3.95	1.015	+0.015
1979/80	474	563	7.70	7.43	0.96	-0.04
1980/81	1143	1325	17.86	16.88	0.915	-0.085
1981/82	2862	3108	43.26	38.54	0.89	-0.11
1982/83	6447	6853	91.69	83.98	0.92	-0.08
1983/84	18,892	18,892	253	223	0.88	-0.12
1984/85	117,172	102,882	1518	1152	0.78	-0.22
*1984/85	129,758	116,080	1772	1300	0.73	-0.27

Expenditures on education are expressed in current prices:

1969/70 - 1976/77 in millions of Lirot,
1977/78 - 1982/83 in millions of Shekel,
from 1983/84 in thousands of new Shekel.

Expenditures per student:

1969/70 - 1976/77 thousands of Lirot,
1977/78 - 1982/83 thousands of Shekel,
from 1983/84 new Shekel.

*New series

Source: Statistical Abstract of Israel

the national expenditure estimates include the costs of boarding (thought to be more prevalent for general school pupils) and the teaching staff in the vocational school sector is formally less qualified, leading to lower (salary-related) costs in these schools; again, vocational schools are of larger average size than general schools. These factors may underlie the relatively low vocational schooling costs recorded in Table 5. Finally, the exclusion of depreciation on buildings and equipment from official educational expenditure estimates may have biased the estimates presented in the table in favor of vocational schools: however, the new series introduced in 1984/85, and which includes depreciation, has resulted in a widening of the gap between measured vocational and general school costs.

Further work is now underway on the estimation of unit costs in Israeli secondary schools, based on detailed expenditures of a sample of academic and vocational schools (including both one track and comprehensive schools). The findings from this research, when available, may require some reconsideration of the results in Table 5. Meanwhile, taken at face value, the relative cost estimates, together with the regression results reported earlier, do suggest that vocational education in Israel is at least as cost-effective as academic education at the secondary level of schooling. This conclusion is strengthened when account is taken of additional outcome factors, to which we turn.

The two groups of individuals on whom this study focusses, academic and vocational secondary school completers, are drawn from very different populations. Vocational school pupils differ from their academic

secondary school counterparts in a number of ways. They tend to be of lesser academic ability, to come from a lower socio-economic background, are more likely to be of Oriental origin and their parents are less educationally qualified.[15/]

Since it was not possible to control for all of these factors in the regressions, our finding of equal earnings for the two groups may not imply equal secondary schooling outcomes. In the absence of secondary schooling, those who attended a vocational school would be expected to earn less than their academic school peers: attendance at a secondary school will have resulted in a closing of the earnings gap between the two groups. In this case, the 'value added' of vocational schooling is greater than that of academic schooling, given the heterogeneity of the two groups.

Not only may the full earnings impact of vocational schools (which we are not able to measure in this study) exceed that of academic schools, but externality effects too may be greater. In Section 1 we noted that the objectives of the vocational schooling system in Israel extend considerably beyond that of supplying skilled workers to the economy. These wider, equity, aims include the provision of a schooling framework for less advantaged and lower ability youngsters ('to keep them off the streets'), and their integration into work and, at age 18, into compulsory military service. While, again, we are not able to put a price tag on these societal

---

15 Median years of parental schooling of boys in academic secondary schools is 10.6. Comparable figures for vocational schooling tracks are as follows: metal work, 7.8; automobile, 7.3; electricity and electronics, 10.0; fashion and tailoring, 7.4; hotel and tourism, 8.0. See Bar (1984).

benefits, it is clear, particularly in the Israeli context, that they are real and tend to raise the underlying social rates of return to vocational education.

3. Vocational Education, Occupational Choice and Earnings

The previous section has been concerned with a comparison of the earnings of vocational and academic secondary school graduates. In this section we pose the questions: to what extent are vocational school completers employed in occupations related to the main subject area studied at school? Are there significant differences in the earnings of those employed in jobs related to subject studied at school and those not working in subject-related occupations?

Education-occupation matchings:

The Census questionnaire was unusual in addressing a specific question to those individuals whose formal education terminated at the agricultural or vocational secondary school, concerning the main subject of study, whether in Agriculture, Electricity, Electronics, Metal work, Auto-mechanics, Clerical and book-keeping, Sewing and fashion, and Hotel management.

For each vocational school completer, we compared subject studied with current job held (using 2-digit occupational codes) to see if vocational education received was related to occupation. Two alternative

matching procedures were employed, "direct" matchings and "wider" matchings. For direct matchings, a worker is defined as matched if he works is in an occupation directly related to the subject studied; for example, the subject of Electricity and the occupational category Electricians/ Electronic Fitters constitute a direct match. Wider matchings include closely related occupations, in addition. In the latter case we take account of the dynamics of career development: thus an individual who had studied Electricity might go on to become a Technical Salesman or open his own electrical business as a Working Proprietor in the Retail Trades. While admittedly judgmental, it is not thought that the procedures adopted would occasion any great dissent.[16/]

Table 6 shows the proportion of matched workers, by field of study, according to direct and wider matching regimes. Overall, 37 percent of vocational school completers were employed in occupations related to the course of study pursued (47 percent on the basis of the wider matchings). Leaving aside the categories Sewing and fashion, and Hotel management, where the number of observations are small, the proportion of matched workers does not differ markedly across subject of study categories (with the exception of Agriculture). Relative frequencies range from 38-51 per-cent for direct matchings and between 45-60 percent for wider matchings; ranking by subject

---

16 Details of the educational - occupational equivalences used in the matchings procedure is provided in the Appendix.

Table 6

Numbers and Average Monthly Earnings of Matched and Non-Matched Workers by Subject of Study
Full Time Male Salaried Workers, Completers of Vocational Schools - Israeli Census, 1983

Area of Study	All Vocational School Completers		Direct Training-Occupation Matchings			Wider Training-Occupation Matchings		
	Number of Workers	Average Monthly Earnings*	Percent of Workers in Matched Occupation**	Average Monthly Earnings of Matched Workers*	Average Monthly Earnings of Non-Matched Workers*	Percent of Workers in Matched Occupations**	Average Monthly Earnings of Matched Workers*	Average Monthly Earnings of non-Matched Workers*
Agriculture	1002	37,898 (28,782)	6.09 (61)	29,324 (11,861)	38,448 (29,453)	14.47 (145)	45,849 (28,814)	36,571 (28,408)
Electricity	1357	37,602 (27,694)	42.08 (571)	37,768 (18,918)	37,482 (32,639)	51.14 (694)	41,217 (34,151)	33,824 (17,694)
Electronics	691	43,759 (29,633)	49.06 (339)	51,215 (35,915)	36,579 (19,461)	60.35 (417)	50,212 (34,142)	33,938 (16,814)
Metal work	4337	36,834 (28,530)	37.91 (1644)	36,944 (26,525)	36,767 (29,693)	45.35 (1967)	39,996 (37,134)	34,210 (18,170)
Automechanics	1967	36,341 (22,450)	42.76 (841)	37,122 (23,655)	35,757 (21,497)	56.58 (1113)	38,556 (25,517)	33,451 (17,258)
Bookkeeping, Secretarial & Clerical	331	38,007 (22,045)	51.06 (169)	37,990 (19,139)	38,025 (24,777)	58.31 (193)	40,945 (22,257)	33,899 (21,148)
Sewing & Fashion	20	30,213 (16,522)	20.00 (4)	17,827 (3,175)	33,516 (17,126)	20.00 (4)	17,827 (3,175)	33,516 (17,126)
Hotel Management	93	29,433 (10,893)	40.86 (38)	31,009 (10,112)	28,344 (11,364)	40.86 (38)	31,009 (10,112)	28,344 (11,364)
TOTAL	9798	37,396 (27,129)	37.4 (3667)	38,274 (25,638)	36,870 (27,973)	46.7 (4571)	40,892 (33,104)	34,338 (20,037)

* Standard deviations in parenthesis
** absolute numbers in parentheses

differs somewhat for the two matching processes.[17/]

The table also reports average monthly earnings for matched and non-matched workers, by subject. For the wider matchings, average earnings of matched workers consistently exceed those of non-matched workers (on average by about 20 percent). Turning to the directly matched workers, the average earnings differential falls to only 4 percent, though the picture differs according to field of study: earnings are higher for Electronics and Auto-mechanics, lower for Agriculture, and similar for the remaining three subjects. These comparative earnings figures (as we shall see) must be treated with caution, since they are "gross" results, with no control made for other factors that may differentially influence earnings, i.e. differences in other characteristics of the two groups, such as years of schooling, experience, quantity of work, and so on. The regression analysis that follows presents "net" results.

Earnings functions:

Earnings functions are estimated for the sub-sample of 9788 individuals who completed vocational secondary school.[18/] The objective of

---

[17] There is also considerable stability of the matched proportion, by age. For the quinquennial age groups between age 25-49, the percentage of matchings were:

	Age					
	25-29	30-34	35-39	40-45	45-49	All Age Groups
Direct Matchings	38.2	39.5	36.6	33.6	33.0	37.4
Wider Matchings	44.4	48.9	47.5	45.0	48.4	46.7

[18] The results we presented more fully in Neuman and Ziderman, 1988B.

the regression analysis is to examine whether there are significant differences between vocational school completers that work in field-of-study related occupations and those who do not. The specification of the regression model is similar to Regressions 1 and 2 reported in Table 3, but with the following changes:

a) to test for earnings differences between matched and non-matched workers, a dummy variable VOC.M is introduced, representing matched vocational school completers, with non-matched in the constant term (VOC.M replaces VOC used in Regressions 1 and 2).

b) a series of dummy variables representing subject of study is included (with Agriculture as the reference group) in order to test for differences in earnings due to subject of study: ELECTRIC (Electricity), ELECTRON (Electronics), METAL (Metal work), AUTO (Automechanics), CLERIC (Clerical and book-keeping), SEW (Sewing and fashion) and HOTEL (Hotel management). Occupation dummies are now excluded, because of a high correlation between vocational subject studied and occupation.

Results are presented in Table 7, on the basis of direct and wider matchings, respectively. Overall, the results are similar to those of Table 3 relating to the whole sample, for common variables.

Table 7

Regressions of Monthly Earnings (ln)
Full time, Male, Salaried Workers, Completers of Vocational Schools - Israeli Census, 1983
n=9798

Independent Variable	Direct Matchings		Wider Matchings	
	Co-efficient	t-statistic	Co-efficient	t-statistic
YRS.SCH	0.024	1.51	0.022	1.38
EXP	0.025	2.13	0.025	2.06
EXP^2	-0.0007	5.07	-0.0007	4.98
EXP*YRS.SCH	0.002	2.37	0.002	2.36
Certification:				
P.CERT	0.011	0.44	0.013	0.38
S.CERT	0.073	3.10	0.067	2.84
BAG	0.112	3.46	0.103	3.23
WEEKS (ln)	0.302	13.16	0.298	13.05
HOURS (ln)	0.374	9.66	0.367	0.53
ETHNIC	-0.137	11.84	-0.134	11.66
Economic Sector:				
IND	0.101	3.08	0.095	2.90
ELECT	0.284	6.48	0.285	6.54
COMM	0.11	0.30	0.008	0.23
FIN	0.133	3.31	0.139	3.49
TRANS	0.084	2.36	0.092	2.58
PUB	0.019	0.55	0.033	0.95
PRIV	-0.047	1.16	-0.054	1.34
CONST	-0.005	0.14	0.00002	0.00
Subject of Study:				
ELECTRIC	0.055	2.36	0.033	1.43
ELECTRON	0.184	6.62	0.158	5.67
METAL	0.057	2.88	0.040	2.01
AUTO	0.042	3.27	0.043	1.97
CLERIC	0.044	1.25	0.016	0.46
SEW	-0.053	0.42	-0.054	0.43
HOTEL	-0.024	0.41	-0.038	0.65
VOC.M.	0.055	4.54	0.114	9.80
Intercept	6.771	25.72	6.838	26.07
R^2	0.155		0.161	

Of more central importance, however, are the coefficients on the VOC.M term; a positive sign would indicate that, given actual number of years of schooling, course of vocational study and type of certification obtained, vocational school completers that were employed in study-related jobs earn more than those who were not. The coefficients show that matched workers do achieve higher earnings than their non-matched counterparts: by about 6 percent for the direct matchings and over 11 per-cent for the wider matchings.[19/] [20/] In addition, it is seen that subject of study does exert a differential effect on earnings. For the wider matchings those who studied Electronics (a small group of 691 out of 9798) have the highest earnings, exceeding those of the base group (Agriculture) by about 16 percent. Metal work and Automechanics (the two largest groups, with 4337 and 1967 respectively) have higher earnings of about 4 percent compared with Agriculture, while for the other groups there is no earnings advantage.[21/]

Given that earnings differ by course of vocational study, the question arises whether our result for the whole sample, that individuals

---

19 The actual percentage effect of the VOC.M dummy variable on earnings is somewhat higher than the dummy variable coefficient multiplied by 100 (see Halvorsen and Palmquist, 1980).

20 In some additional regression runs (not reported here but available on request) interaction terms between VOC.M and between YRS.SCH and EXP, respectively, were added, parallel to the specification of Regression in Table 3. Here again evidence was found that the improved labor market performance of matched workers functions through the human capital variables (years of schooling and years of job experience); thus for the wider matchings, matched workers earn more than an additional 2 per-cent annually for each year of schooling, over non-matched workers, and 0.5 per-cent for each year of labor market experience.

21 These rankings differ from those based on mean salary presented in Table 3: this is because for the latter, there was no control for other explanatory variables, as there is in the regressions.

working in matched occupations earn more than those who do not, also holds for each of the courses of study pursued. To test this, we reran the regressions reported in Table 7 (but dropping the subject of study dummies), for each subject course for which there were sufficient observations. The VOC.M coefficients were found to be positive and significant for all of the regressions based on the wider matchings and for the majority of the direct matchings regressions, thus confirming overall that the differential earnings effect is present for the course of study sub-samples. For the wider matchings regressions, the VOC.M coefficients were as follows (the t statistic is shown in parentheses): Agriculture 0.172 (3.05), Electricity 0.117 (3.59), Electronics 0.262 (5.52), Metalwork 0.103 (5.98), Automechanics 0.098 (4.04), and Clerical 0.205 (3.07).

How does our finding, that individuals educated at vocational secondary schools earn more if employed in an occupation related to their course of study, relate to the results presented in the previous section? There, it was reported that no significant difference was found between the average earnings of individuals educated at academic secondary schools and the earnings of vocational secondary school completers, as a whole. How do the earnings of each sub-group of vocationally educated individuals compare with those who go through the general secondary school stream? We probe these issues in the regressions reported in Table 8.

Returning to the broader sample, comprising both vocational and academic secondary completers, two dummy variables, relating to type of secondary school attended, are now defined: VOC.M (= 1, if the worker is a

vocational school completer working in a matched occupation, and =0 if otherwise), and VOC.U (=1 if he is an unmatched vocational school completer, and =0 if otherwise). The reference group is thus workers who have completed general secondary schooling. A positive (negative) coefficient on one of the VOC sub-categories would indicated higher (lower) average earnings than for those individuals that had completed an academic secondary school. The regression model specification is otherwise parallel to that of Regression 2 in Table 3; a set of occupational dummies replace the subject-of-study dummies used in the regressions in Table 7 (the Census did not collect information on the latter for academic secondary school completers).

The reported coefficients on the VOC.M and VOC.U variables in the regressions in Table 8 are significantly positive and nonsignificant, respectively. The implication of these results is clear. They indicate that while there is no difference in earnings between academic school completers and those vocational school completers that work in occupations unrelated to vocational courses studied at school, the earnings of workers employed in matched occupations exceed those of workers who attended academic schools (by over 8 per cent in the regression relating to wider matchings and by approaching 10 per cent for direct matchings).[22/]

---

[22] These results may, at first glance, appear to be in conflict with the data reported in Table 7, where the coefficient on the VOC.M term is larger for the wider matchings regressions; here the opposite is the case. However, the samples and the reference group differs in the two sets of regressions. Table 7 regressions relate to vocational school completers only and compare the earnings of the two sub-groups within this category. In contrast, the Table 8 regressions include, in addition, academic school completers, and compares the matched and non-matched vocational school completer sub-groups separately, with their counterparts from the academic schools.

Table 8

Regressions of Monthly Earnings (ln) Full Time, Male, Salaried Workers General and Vocational School Completers Israeli Census, 1983 (n=13879)

Independent Variables	Direct Matchings Coefficient	Direct Matchings t-Statistic	Wider Matchings Coefficient	Wider Matchings t-Statistic
YRS.SCH	0.017	1.34	0.017	1.29
EXP	0.034	3.52	0.034	3.49
EXP^2	-0.0008	7.32	-0.0008	7.31
EXP*YRS.SCH	0.001	1.79	0.001	1.82
WEEKS(ln)	0.312	16.58	0.312	16.57
HOURS (ln)	0.312	9.60	0.313	9.64
ETHNIC	-0.131	13.59	-0.129	13.43
Economic Sector:				
IND	0.072	2.40	0.069	2.30
ELECT	0.260	6.55	0.261	6.59
COMM	-0.028	0.86	-0.027	0.84
FIN	0.128	3.82	0.130	3.88
TRANS	0.073	2.29	0.074	2.32
PUB	-0.029	0.94	-0.026	0.83
PRIV	-0.072	1.99	-0.017	1.96
CONST	0.004	0.13	0.003	0.08
Occupation:				
ACAD	0.283	3.70	0.279	3.65
TECH	0.360	7.99	0.361	8.01
MANAG	0.525	11.65	0.480	10.68
CLER	0.215	4.90	0.211	4.82
SALES	0.224	4.87	0.199	4.35
SERV	0.212	4.60	0.208	4.53
UNSKILL	0.134	2.60	0.134	2.61
SKILL	0.173	4.03	0.174	4.07
Certification:				
P.CERT	-0.001	0.07	-0.001	0.05
S.CERT	0.063	3.18	0.064	3.22
BAG	0.113	4.66	0.116	4.81
VOC.M.	0.096	6.84	0.081	6.27
VOC.U.	-0.003	0.27	0.013	1.05
Intercept	6.940	31.49	6.959	31.57
R^2	0.173		0.173	

The overall regression results in Table 8 lead to an important refinement of the conclusions presented in the foregoing section. We now see that type of school attended, whether vocational or academic secondary, does have an impact on labor market income. It is only when vocational school completers are employed in jobs unrelated to courses of study pursued at school, that earnings are broadly similar to those of workers who studied atacademic secondary schools. For those vocational school completers who work in study-related occupations, average earnings are significantly higher than those of workers who studied at academic secondary schools.

Finally, separate regressions are run for five-year age groups (within the 25-49 age range) to see whether these conclusions hold for each individual age cohort: the same specification is employed except that the experience variables are dropped, since in standardizing by age the number of years of job experience will be similar for individuals within each age cohort. Selected results are given in Table 9, for the certification variables (which indicates a decline in credentialism as age of group increases) and the VOC sub group dummies.

The age cohort analysis confirms the central finding of the regressions relating to the total sample: those individuals that attended vocational schools and work in matched occupations consistently earn more than their counterparts that went through the academic secondary school stream. There is a tendency for the average earnings differential to rise with age, from about 4 per cent for the first age cohort reaching 11 to 15 per cent for the older age groups. Non-matched vocational school completers

Table 9

Regressions of Monthly Earnings (ln), by Age Group, Selected Coefficients: Full Time, Male, Salaried Workers Completers of General and Vocational Schools - Israeli Census, 1983

(Selected Coefficients)

	Age Group: 25-29		Age Group: 30-34		Age Group: 35-39		Age Group: 40-44		Age Group: 45-49	
	Direct Matchings	Wider Matchings	Direct Matchings	Wider Matchings	Direct Matchings	Wider Matchings	Direct Matchings	Wider Matchings	Direct Matchings	Wider Matchings
P.CERT	-0.007	-0.007	0.028	0.028	0.034	0.033	-0.133	-0.134	0.001	0.002
	(0.22)	(0.21)	(0.65)	(0.65)	(0.71)	(0.69)	(1.96)	(1.97)	(0.01)	(0.03)
.CERT	0.084	0.083	0.049	0.052	0.114	0.111	0.073	-0.074	0.062	0.066
	(2.50)	(2.48)	(1.22)	(1.28)	(2.52)	(2.47)	(1.15)	(1.16)	(1.05)	(1.11)
BAG	0.167	0.167	0.093	0.100	0.136	0.135	0.049	-0.041	0.101	0.107
	(4.20)	(4.22)	(1.88)	(2.02)	(2.34)	(2.34)	(0.64)	(0.54)	(1.38)	(1.45)
VOC. M	0.040	0.042	0.107	0.069	0.088	0.090	0.152	0.115	0.143	0.105
	(1.66)	(1.84)	(3.89)	(2.72)	(2.80)	(3.18)	(3.35)	(2.85)	(3.03)	(2.58)
VOC. U	-0.015	-0.025	-0.055	-0.064	0.028	0.013	-0.027	-0.042	0.041	0.044
	(0.74)	(1.17)	(2.35)	(2.64)	(1.08)	(0.50)	(0.79)	(1.16)	(1.16)	(1.15)
	4,500	4,500	3,776	3,776	2,778	2,778	1,492	1,492	1,333	1,133
R^2	0.084	0.085	0.107	0.104	0.147	0.148	0.195	0.194	0.195	0.194

t values in parentheses

do not display any significant difference in earnings from the reference group, with the exception of the 30-34 age cohort, which earns less.

Costs and benefits of vocational schooling

The regression analyses show that, given the higher earnings accruing to vocational school completers working in matched occupations (i.e. occupations related to course of study), overall, terminal vocational secondary education yields higher monetary benefits than general academic education. It was shown in Table 5 that for the financial year 1982/83, which most closely relates to the year of the Census, vocational schooling costs per student were on average 8 per cent below those of academic schools. In overall terms these relative cost estimates, together with the regression results on the benefits side, point to a benefit-cost advantage of terminal vocational over academic schooling in Israel.

However, we have noted the widely held view in Israel that vocational education is the more costly, by up to a third.[23/] If this were indeed so, then it might be the case that the higher costs of vocational education would offset the benefits, so that the net present value (NPV) of vocational schooling over academic schooling would be negative. In order to test this, we subjected our overall results to a series of sensitivity tests, by experimenting with alternative values of the parameters in the following equation:

---

[23] This view was expressed in interviews with relevant government officials.

Table 10

Incremental Net Present Value of Vocational Schooling over Academic Secondary Schooling

(Israeli Shekel, per student)

	Direct Matchings (v = 0.96)			Wider Matchings (v = 0.81)		
	Relative vocational school costs (c)			Relative vocational school costs (c)		
	-0.08	0.00	+0.33	-0.08	0.00	+0.33
Discount Rate (i): 5%						
Percentage in matched occupations (m):						
27%	151 096	131 120	48 721	-	-	-
37%	199 659	179 683	97 284	171 583	151 608	69 209
47%	-	-	-	212 558	191 583	110 183
Discount Rate (i): 8%						
Percentage in matched occupations (m):						
27%	99 123	80 219	2 242	-	-	-
37%	128 834	109 930	31 953	111 657	92 754	14 777
47%	-	-	-	136 726	117 822	39 845
Discount Rate (i): 10%						
Percentage in matched occupations (m):						
27%	77 985	59 744	-15 503	-	-	-
37%	100 113	81 871	6 625	87 320	69 079	-6 168
47%	-	-	-	105 990	87 749	12 502

$$NPV = \sum_{t=1}^{n} (m\ v\ Y_A - c\ C_A)(1 + i)^{-t},$$

where

Y_A measures average income of academic school completers, in year t

v is the proportional earnings advantage of vocational school completers working in matched occupations

m is the proportion of vocational school completers employed in matched occupations

c relates to excess vocational schooling costs over academic school costs, and is measured by the ratio $(C_V - C_A)/C_A$, where C_V and C_A measure annual costs per student in vocational and academic schools, respectively.

i is the discount rate, and

n is the time horizon of the appraisal.

Results are presented in Table 10, on the basis of a 35 year time horizon (including three years of army service from age 18), a (conservative) secular annual increase in incomes of 1 per cent, and three years of secondary schooling.[24] Our central findings, with positive NPVs, are shown underlined: for direct matchings these relate to v = 0.096 and m = 0.37 (based on the matched percentages given in Table 1), and for wider matchings to v = 0.081 and m = 0.47, with c = -0.08 and i = 0.08 in both cases.[25]

---

[24] Under the 1968 Reform of the Israeli educational system, secondary high schools offer a 3-year program, compared with four years previously.

[25] Even if a 4-year secondary school program is assumed, the NPVs remain positive.

The table shows alternative NPV results, based on different combinations of higher relative vocational costs (positive value for c) alternative discount rates and lower value for the m parameter. The overall effect of all these differing combinations, while changing the level of the NPVs, is to leave them positive. Only in the worst assumption case, with high vocational school costs (in excess of those of academic schools by a third), of a 10 per cent discount rate and a lower matched percentage (ten percentage points below those relating to the sample), are the NPVs negative, but only marginally so.[26/] We may conclude that vocational schooling in Israel represents a sound investment in cost-benefit terms. This overall conclusion would be strengthened if a higher secular increase in real incomes was assumed, as seems plausible, with a resultant enhancement in absolute terms of the earnings advantage of matched vocational school completers.

4. Vocational education and non-formal training alternatives

We noted that the 1983 Census questionnaire included within the category of vocational school completers those individuals that had attended nonformal training institutions rather than vocational schools as such. Our sample of vocational school completers in fact includes a small number of these individuals that had instead completed training in one of these nonformal modes. In this section we shift our focus from a comparison of

---

[26] With this configuration, the NPV "loss" represents about two weeks salary for direct matched workers and only a few days salary for the wider matchings case.

vocational schools with academic schools, to one with alternative training modes for youth.

These alternative training modes for youth represent the residual areas of control that remained with the Ministry of Labor after the transfer of vocational secondary schools to the Ministry of Education in the late 1950s. In 1986 some 17,500 youth were enrolled in these institutions, which cater for youngsters from disadvantaged backgrounds who are unable to be accommodated by the regular schooling system. There are essentially three main types of training institutions for youth run by the Manpower Training and Development Bureau of the Ministry of Labor.[27/] The traditional apprenticeship and courses at industrial schools (located in the plants of various major industrial companies) typically last four years, with the week equally divided between theoretical studies in a classroom setting and practical training on-the-job: they are broadly comparable with the vocational school masmam track.[28/] The one-year full-time training courses for 16-17 years old (many of whom are drop outs), are devoted almost entirely to practical training for teenagers of weaker academic ability. The industrial school stream, accounting for over half of all youth enrolled in these programs, is both the largest and growing slowly; the other streams are in gradual numerical decline.

---

27 See Kroner (1987) for a review of these programs for disadvantaged youth.

28 These equivalences were formally instituted by an Agreement, signed between the Ministries of Education and Labor on the "Equalization of schooling and vocational training in the granting of graduation certificates", August 1984.

Accounting for some 7 per cent of 15-17 years old (compared with the over 80 per cent that attend secondary schools) these training institutions are marginal in Israel, not only in terms of numbers. Unlike the case in many other countries, historically an amalgam of cultural and social factors have militated against any major role being accorded to these non-schooling training modes in Israel. A detailed consideration of the essentially non-economic reasons underlying the peripheral role played by nonformal training modes in Israel is beyond the scope of the present paper.[29/] Nor is it germane to the question at hand. The issue is not how these existing institutional arrangements came into being, but rather, given their origins, whether they remain relevant over the longer term as circumstances change.

A decade ago, in a cost effectiveness comparison of the four main vocational training modes for youth in Israel (Borus 1977), Michael Borus argued that vocational schools were not cost effective in relation to other training modes, particularly the traditional apprenticeship. Examining the earnings of a sample of individuals who had completed one of the four main training modes, for the two years after completing training (following a three-year period of compulsory military service) Borus was unable to find any significant earnings differences between the four groups. Yet vocational schooling is by far the most costly mode. Borus showed the average societal cost per completer of industrial schools and short teenager courses to be from a third to a quarter of that of vocational schools; course completer

---

[29] The interested reader is referred to Iram and Balicki (1980) for a discussion of these issues, comparing and contrasting the systems of vocational education and training in Israel and Switzerland.

costs for the apprenticeship were only one seventh of vocational school costs.[30/]

The results of Borus's research related to only two years post-training labor market experience, and were thus silent about outcomes over the longer term. A more recent paper (Ziderman 1988), employing a similar methodology, followed up a larger sample of training course completers over a ten year period (including the three years of army service). Again, no significant earnings differentials were found between individuals who had attended vocational schools and between apprenticeship and industrial school completers, respectively.[31/]

On grounds of cost-effectiveness, these findings indicate the desirability of a redirection, at the margin, of youth training for the skilled manual trades in Israel, away from vocational schools (principally the masmam track) towards non-formal job-related training modes.[32/] Yet it

---

30 Based on the then current regime for apprenticeships of one day of classroom instruction per week and five days training on-the-job; the subsequent move towards a system of three days classroom and three days training will have raised average apprenticeship costs towards those of the industrial school.

31 For a number of the follow-up years, completers of the teenager courses did sustain lower earnings than individuals emanating from vocational schools. Although not in line with those of Borus, this particular result is not altogether unexpected. Most of the students enrolled in these teenager courses came from very low socio-economic backgrounds, many were drop outs from secondary schooling and the courses, though full-time, lasted for up to a year only (compared with three to four years for the other training modes).

32 Indeed, in comparison with other countries, the ten per-cent of youth aged over 15 that is attached to the labor market (including those both studying and working) is inordinately low: for details, see the ILO Year Book of Labor Statistics.

is the policy of both ministries concerned to work towards a movement in the opposite direction, with the aim of effecting improvement in the status of presently disadvantaged youth that are currently (or not as yet) under the Ministry of Labor umbrella, enabling them to enter the regular secondary school system. The industrial school and the formal apprenticeship, the dominant training modes for youth in many countries, are not viewed as potential main stream alternative training institutions, operating alongside and in competition with vocational schools. Very little is done to develop them in this direction, and the stigma remains. As we have emphasized, the general consensus in Israel is that the appropriate framework for all youngsters up to age 18 is a formal schooling one. This is evidenced in the upward movement over time in the percentage of youth aged 14-17 enrolled in school.[33/] This consensus has acted as a barrier against any broadening of the non-formal training system in Israel.

There are, in addition, other institutional factors that have militated against the development of non-formal training modes. To take but one example: it is argued that firms themselves may be unwilling or unable to assume a major role. Lacking in Israel are the necessary cadres of training instructors to effect good quality on-the-job training; the institution of the meister, so central to the success of the German dual system, is absent in Israel. The question however remains: given the lack of cost-effectiveness of vocational schools' lower tracks in relation to non-formal training alternatives, will initiatives be taken to begin to develop these necessary capabilities, a prerequisite for the fashioning of a

---

33 From 60 percent in 1962 to well over 85 per cent today.

parallel workplace-orientated training system. In the present climate, it would seem that the chances are slim.

5. Summary and Conclusions

This paper examines, for the case of Israel, the efficacy (in terms of labor market outcomes) of vocational school education in relation to that of the academic secondary school, for non-postsecondary school attenders. Given the relatively small fraction of youth that attend, and complete, tertiary education in developing countries, the secondary school completer population that does not continue into tertiary education, plays an important role in economic development. Since vocational schooling in Israel is sizeable - with over half of Israeli secondary school pupils attending vocational schools or vocational streams in comprehensive schools, it is quantitatively far more important than in most other countries - the Israeli setting seems to be a fitting one for a case study comparing the outcomes of academic and vocational schooling. It is hoped that the study contributes to a firmer basis for policy decisions concerning the appropriate role to be accorded to vocational education within the schooling system as a whole.

Using data from the 1983 population census, the study shows vocational schooling to be more cost-effective than general academic education. In particular, those vocational school completers that work in occupations related to the course of study pursued at school earn more (by up to about 10 per cent annually) than their counterparts that attended

general secondary schools or those from vocational schools employed in non course related occupations. Since these results seem to be at odds with the predominantly held view (of economists) that vocational schooling is a socially inefficient form of education, particularly in relation to traditional academic schools, it seems appropriate to probe further this apparent discrepancy.

In the standard text on the economics of education, Mark Blaug discusses the usual distinction drawn between academic and vocational education, in this way:

> This distinction, which is actually grounded in the nature of the two curricula, is allowed to carry the implication that some education prepares students for the 'world of work' and some does not. All too frequently, however, those who have taken courses of study generally called 'academic'.....reap substantial financial returns from their education, thus producing the paradoxical conclusion that academic education has a greater 'vocational' value than vocational education. The traditional distinction was developed by educators but the labor market has its own way of appraising qualifications. (Blaug 1970, p 247).

And, indeed, a large number of cost-benefit analyses, based on labor market earnings follow-up studies of vocational and academic secondary school completers, have shown that the higher costs of vocational school education (as measured in these studies) are not offset usually by any positive or sizeable earnings differential accruing to vocational school completers. The main thrust of all this research is to reveal general secondary schools as the superior societal investment, thus giving some underpinning to the conventional wisdom, referred to above.

However, these results must be interpreted with care. Particularly when the secondary school enrollment ratio is sizeable, pupils in the two types of schools differ in background characteristics which, in turn, are correlated with earnings. Thus it is argued that in many countries, academic secondary schooling provides access to tertiary education and more attractive life chances than vocational schools. Competition for entry into academic schools leads to rationing of places on the basis of student academic ability: social class and parental background also play a role. Unless these factors are controlled for in comparing the earnings of general and vocational school completers, biassed estimates of the differential earnings effect will result. Studies reporting equal post-schooling earnings for the two groups may be masking very real differences in labor market outcomes favoring vocational school completers.

The present paper has shown the importance of broadening the scope of these evaluation studies, particularly in relation to labor market outcomes. Too often such studies concentrate on earnings, without taking into account such intervening variables as type of occupation and its relevance to vocational studies pursued. In this case study, we have seen that such considerations are central to a proper understanding of the labor market outcomes of vocational schooling.[34/] Future evaluation studies will need to pay more attention to issues of curriculum (including the type and

---

[34] In a recent paper Hartog (1985), comparing the earnings of vocational and general schooling in the Netherlands, shows that the introduction of intervening dummy variables for job level, as additional explanatory variables in the regression analysis, changes considerably the nature of the results.

scope of vocational studies), as well as to the nature of the occupation followed and its relationship with prior courses of study pursued.

References

Benavot, A. "The rise and decline of vocational education," Sociology of Education, April 1983.

Bar, E. Secondary School Education in Israel, Jerusalem: Ministry of Education and Culture, Planning Branch, March 1984.

Blaug, M. An Introduction to the Economics of Education, Penguin 1970.

Borus, M.E. "A Cost effectiveness comparison of vocational training for youth in developing countries: a case study of four training modes in Israel", Comparative Education Review, February 1977

Dougherty, C.R.S. and E. Jimenez, "The specification of earnings functions: tests and implications," Education and Training Discussion Paper Series No.100, Washington, D.C: The World Bank, June 1987.

Easterlin, Richard A. "Israel's development: past accomplishments and future problems", Quarterly Journal of Economics, February 1961.

Grootaert, C. Côte d'Ivoire's Vocational and Technical Education, PPR Working Paper No. 19, The World Bank, Washington, D.C., June 1988.

Foster, P.J. "The vocational schooling fallacy in development planning," in C.A. Anderson and M.J. Bowman (eds.) Education and Economic Development, Chicago: Aldine Publishing Company, 1965.

Halvorsen, R. and R. Palmquist, "The interpretation of dummy variables in semilogarithmic equations," American Economic Review, Vol.70, No.3, 1980.

Hartog, J. "Earnings functions: beyond human capital", Applied Economics, 1986.

Iram, Y. "Social policy and education for work in Israel," Issues in Education, Vol. 4, No. 3, Winter 1986.

Iram, Y. and C. Balicki, "Vocational education in Switzerland and Israel: comparative analysis", Canadian and International Education, Vol. 9, 1980.

Kahane, R. and L. Starr, The impact of rapid social change on technological education: a Israeli example," Comparative Education Review, June 1976.

Katz E. and A. Ziderman, "On education, screening and human capital," Economic Letters, Vol.6, 1980.

Komenan A. and A. Ziderman, "Is vocational education in retreat: an international comparison ?" forthcoming, 1989.

Kroner, Y. Preparing of Disadvantaged Youth for Employment, paper presented at the US-Israel Labor Conference, Washington, D.C. Jerusalem: Ministry of Labor and Social Affairs, Manpower Training and Development Bureau, November 1987.

Metcalf, D.H. The Economics of Vocational Training: Past Evidence and Future Considerations. Staff Working Paper No. 713. Washington, D.C.: The World Bank, 1985.

Mincer, J. Schooling, Experience and Earnings, New York: National Bureau of Economic Research, 1974.

Moock, P.R. and R.T. Bellew, Vocational and Technical Education in Peru, PPR Working Paper, The World Bank, Washington, D.C. 1988.

Neuman, S. and A. Ziderman, "Vocational schools can be cost-effective in relation to academic schools: an Israeli case study". Mimeo 1988A.

Neuman, S. and A. Ziderman, "Vocational education, occupational relevance and earnings: the case of Israel," Mimeo 1988B.

Psacharopoulos, G. "To vocationalise or not to vocationalise: that is the curriculum question," International Review of Education. 33(2), 1987.

Tilak, J.B.G. "Economics of vocationalization: a review of the evidence", Canadian and International Education, Vol. 17, No. 1, 1988.

Technological Education in Israel. Jerusalem: Department of Technological Education, Ministry of Education, 1987.

Ziderman, A. Israel's Vocational Training, PPR Working Paper No 26, The World Bank, Washington, D.C. The World Bank, July 1988

Ziderman, A. "Alternative training modes for youth in Israel: results from longitudinal data," Comparative Educational Review, May 1989.

Zymelman, M. The Economic Evaluation of Vocational Training Programs. Baltimore: The John Hopkins University Press, 1976.

APPENDIX

Matching of Vocational Education Course with Occupation

Subject of Study	No. of Course Completers	Matching Occupations: Direct Matchings — Matched Occupations	No. of Matched Individuals	Matching Occupations: Wider Matchings (Additional to Direct Matching Occupations) — Matched Occupations	No. of Matched Individuals
Agriculture	**1002**	Farm proprietors (working their own farm)	10	Other managers	84
		Farm managers	25		
		Skilled workers in agriculture	24		
		Farm hands	2		
		% directly matched	**6.1%**	**% more widely matched**	**14.8%**
Electricity	**1357**	Engineering technicians and practical engineers	95	Other managers	76
		Electrician and electronic fitters	476	Working proprietors in retail trades	10
				Technical salesmen	37
		% directly matched	**42.1%**	**% more widely matched**	**51.1%**
Electronics	**691**	Engineering technicians and practical engineers	203	Other managers	54
		System analysts and computer programers	7	Working proprietors in retail trades	3
		Electricians and electronic fitters	119	Technical Salesmen	21
		Fitters of precision instruments	10		
		% directly matched	**49.1%**	**% more widely matched**	**60.4%**
Metal Work	**4337**	Engineering technicians and practical engineers	140	Other managers	214
		Raw metal processors	37	Technical salesmen	109
		Tinsmiths, welders, blacksmiths & workers in finished metal products	1185		
		Assemblers, installers & repairmen of machines and transport vehicles	222		
		Pipe fitters and plumbers	60		
		% directly matched	**37.9%**	**% more widely matched**	**45.4%**
Automechanics	**1967**	Engineering technicians and practical engineers	64	Other managers	87
		Mechanical equipment operators	4	Technical Salesmen	69
		Assemblers, installers & repairmen of machines and transport vehicles	477	Tinsmiths, welders, blacksmiths and workers in finished metal products	116
		Operators of digging, building and road construction equipment	61		
		Drivers	235		
		% directly matched	**42.7%**	**% more widely matched**	**56.6%**

APPENDIX (continued)

Subject of Study	No. of Course Completers	Matched Occupations	No. of Matched Individuals	Matched Occupations	No. of Matched Individuals
Clerical and Book Keeping	331	Supervising clerks	8	Other Managers	24
		Bookkeepers	102		
		Secretaries, typists and key punch operators	9		
		Store Clerks, warehouse workers and filing clerks	19		
		General office clerks	10		
		Othr clerical workers	21		
			51.1%		58.3%
Sewing and Fashion	20	Tailors, sewers and related workers	4	-	
		% directly matched	20.0%	% more widely matched	20.0%
Hotel Trades and Home Economics	93	Cooks,	10	-	
		Waiters and bartenders	28		
		% directly matched	40.9%	% more widely matched	40.9%
All Courses Of Study	9798	% directly matech	37.4%	% more widely matched	46.7%

PPR Working Paper Series

	Title	Author	Date	Contact
WPS122	Import Demand in Developing Countries	Riccardo Faini Lant Pritchett Fernando Clavijo	November 1988	K. Cabana 61539
WPS123	Export Supply, Capacity and Relative Prices	Riccardo Faini	November 1988	K. Cabana 61539
WPS124	International Macroeconomic Adjustment, 1987-1992: A World Model Approach	Robert E. King Helena Tang	November 1988	K. Adams 33738
WPS125	The Effects of Financial Liberalization on Thailand, Indonesia and the Philippines	Christophe Chamley Qaizar Hussain	October 1988	A. Bhalla 60359
WPS126	Educating Managers for Business and Goverment: A Review of International Experience	Samuel Paul John C. Ickis Jacob Levitsky	November 1988	E. Madrona 61711
WPS127	Linking Development, Trade, and Debt Strategies in Highly Indebted Countries	Ishac Diwan	November 1988	I. Diwan 33910
WPS128	Public Finances in Adjustment Programs	Ajay Chhibber J. Khalilzadeh-Shirazi	December 1988	A. Bhalla 60359
WPS129	Women in Development: Defining the Issues	Paul Collier	December 1988	J. Klous 33745
WPS130	Maternal Education and the Vicious Circle of High Fertility and Malnutrition: An Analytic Survey	Matthew Lockwood Paul Collier	December 1988	J. Klous 33745
WPS131	Implementing Direct Consumption Taxes in Developing Countries	George R. Zodrow Charles E. McLure, Jr.	December 1988	A. Bhalla 60359

PPR Working Paper Series

	Title	Author	Date	Contact
WPS132	Is the Discount on the Secondary Market A Case for LDC Debt Relief?	Daniel Cohen	November 1988	M. Luna 33729
WPS133	Lewis Through a Looking Glass: Public Sector Employment, Rent-Seeking and Economic Growth	Alan Gelb J.B. Knight R.H. Sabot	November 1988	A. Hodges 61268
WPS134	International Trade in Financial Services	Silvia B. Sagari	January 1989	W. Pitatatonakarn 60353
WPS135	PPR Working Papers Catalog of Numbers 1 to 105	PPR Dissem. Center	November 1988	Ann Van Aken 31022
WPS136	Pricing Commodity Bonds Using Binomial Option Pricing	Raghuram Rajan	December 1988	J. Raulin 33715
WPS137	Trends in Nontariff Barriers of Developed Countries: 1966 to 1986	Sam Laird Alexander Yeats	December 1988	J. Epps 33710
WPS138	Fiscal Adjustment and Deficit Financing During the Debt Crisis	William R. Easterly	January 1989	R. Luz 61760
WPS139	A Conceptual Framework for Adjustment Policies	Bela Balassa	January 1989	N. Campbell 33769
WPS140	Building Educational Evaluation Capacity in Developing Countries	John Middleton James Terry Deborah Bloch		
WPS141	Payroll Taxes for Financing Training in Developing Countries	Adrian Ziderman	January 1989	C. Cristobal 33640
WPS142	Vocational Secondary Schooling in Israel: A Study of Labor Market Outcomes	Adrian Ziderman	January 1989	C. Cristobal 33640